long cleaning time and high consumption of chemicals and water for cleaning the draining equipment;

high maintenance costs for the upkeep of the draining equipment.

Whatever the draining technique used, a maximum dry matter is obtained which is limited and insufficient for a certain range of cheeses intended for ripening, it is generally less than 38% dry matter (DM) relative to the cheese (w/w) for a ratio of fat (F) to dry matter, F/DM, ranging from 45 to 55%.

By combining both a specific treatment of the milk before its curdling and a particular draining of the curd, the invention provides a solution to most of the aforementioned problems.

Thus, the disclosure concerns a method for manufacturing a fresh or ripened cheese from a cheese-making dairy mixture containing, on the one hand, one or several dairy fractions selected from the retentates of a microfiltration of a pasteurized skimmed milk, the retentates of an ultrafiltration of a whole milk or a pasteurized skimmed milk, and the retentates of an ultrafiltration of a microfiltration permeate of a pasteurized skimmed milk, and on the other hand cream, said method comprising the following steps:

(I) preparation of the cheese-making dairy mixture by

(Ii) heat treatment of the dairy fraction(s) and cream, respectively, at a temperature of 65-120°C, for 30-900 seconds;

(Iii) mixing of the heat-treated dairy fraction(s) and cream to obtain the dairy mixture; and

(Iiii) standardization of said dairy mixture by adjusting the protein content of the heated mixture to 3-10% (w/w) relative to the mixture and adjusting the fat content of the heated mixture to 3-10% (w/w) relative to the mixture to obtain said cheese-making dairy mixture; or

(Ii') mixing of the dairy fraction(s) and cream to obtain the dairy mixture;

(Iii') heat treatment of the dairy mixture, at a temperature of 65-120°C, for 30-900 seconds; and

(Iiii') standardization of the dairy mixture by adjusting the protein content of the mixture to 3-10% (w/w) relative to the mixture and adjusting the fat content of the mixture to 3-10% (w/w) relative to the mixture to obtain said cheese-making dairy mixture;

(II) maturation (or curdling) of the cheese-making dairy mixture to obtain a curd;

(III) draining of the curd;

(IV) cooling of the drained curd;

(V) salting and molding, or molding and salting; and

(VI) optionally ripening,

a method in which, after step (II), all or part of the curd is heat-treated and in which, in step (III) said heated curd is drained by at least one ultrafiltration and then homogenized.

In one aspect, the present disclosure refers to a method for manufacturing a fresh or ripened cheese from a cheese-making dairy mixture containing, on the one hand, one or several dairy fractions selected from the retentates of a microfiltration of a pasteurized skimmed milk, the retentates of an ultrafiltration of a whole milk or of a pasteurized skimmed milk and the retentates of an ultrafiltration of a microfiltration permeate of a pasteurized skimmed milk, and on the other hand cream, said method comprising the following steps:

(I) preparation of the cheese-making dairy mixture by

(Ii) heat treatment of the dairy fraction(s) and cream, respectively, at a temperature of 65-120°C, for 30-900 seconds;

(Iii) mixing of the heat-treated dairy fraction(s) and the heat-treated cream to obtain the dairy mixture; and

(Iiii) standardization of the heated dairy mixture by adjusting the protein content of the mixture to 3-10% (w/w) relative to the mixture and adjusting the fat content of the mixture to 3-10% (w/w) relative to the mixture to obtain the cheese-making dairy mixture; or

(Ii') mixing of the dairy fraction(s) and cream to obtain the dairy mixture;

(Iii') heat treatment of the dairy mixture at a temperature of 65-120°C, for 30-900 seconds; and

(Iiii') standardization of the heated dairy mixture by adjusting the protein content of the mixture to 3-10% (w/w) relative to the mixture and adjusting the fat content of the mixture to 3-10% (w/w) relative to the mixture to obtain a standardized dairy mixture to obtain the cheese-making dairy mixture;

(II) maturation (or curdling) of the cheese-making dairy mixture to obtain a curd;

(III) draining of the curd;

(IV) cooling of the drained curd;

(V) salting and molding, or molding and salting; and

(VI) optionally ripening,

said method being characterized in that:

after step (II), all or part of the curd is heat-treated, and

in step (III) said heated curd is drained by at least one ultrafiltration and then homogenized.

Homogenization is essential, it can be performed by a technology selected from high pressure, for example at a pressure of 5-800 bars, or shear phenomena applied to the mixture to be homogenized.

Part or all of the curd resulting from step (II) and before its draining by ultrafiltration (III), is heat-treated, preferably at a temperature of 25 to 60°C, for a few seconds to 600 seconds. This optional step corresponds to a reheating of the curd intended to optimize draining performance.

Advantageously, the draining of the heated curd fraction is performed by two consecutive ultrafiltrations.

According to one variant, the entire curd is heat-treated (or reheated) and then drained by at least one ultrafiltration, preferably two ultrafiltrations.

In preferred examples, the ultrafiltration step(s) meets the following characteristics which can be considered alone or indifferently combined with each other.

The ultrafiltration membrane is a ceramic or organic membrane, preferably an organic membrane and even better a combination of at least one organic spiral membrane and at least one organic flat membrane.

Advantageously, the ultrafiltration(s) of the curd is/are performed at the spiral membrane with a pressure of approximately 1.5-3 bars at the inlet and 1-2 bars at the outlet, and at the flat membrane with a pressure of approximately 5 to 10 bars at the inlet and 0.5 to 2 bars at the outlet.

At least one or all of the filtration membranes have a weight cut-off (MWCO) of 10-50 kDa, and preferably 10-20 kDa.

According to one variant, the standardization of the dairy mixture (Iiii) or (Iiii') may further comprise an adjustment of the content of heat-treated native whey proteins by 0-20% (w/w) relative to the total protein content of said standardized milk.

The method of the disclosure may comprise other intermediate steps of homogenization of the dairy mixture during treatment. Thus, one or several

homogenizations may be provided during the step of preparing the cheese-making dairy mixture (I), in particular after any one of the sub-steps (Ii), (Iii), (Iiii), (Ii'), (Iii'), (Iiii'). The homogenization may be performed by a technology selected from high pressure, for example at a pressure of 5-800 bars, or shear phenomena applied to the mixture to be homogenized.

In an example where not all of the curd is heat-treated and subjected to one or several ultrafiltrations, the method of the disclosure may further comprise a step of draining the other part of the curd not subjected to heating and ultrafiltration, which may be carried out by a conventional technique, for example on a Berge filter. At the end, this part of the curd thus drained, or retentate, and the permeate may be recovered.

The conventionally drained part of the curd and the ultrafiltration-drained curd are cooled and are advantageously brought together before molding or salting. This variant does not significantly impair the cheese-making aptitude of the curd thus obtained. Under these conditions, the permeate of the conventionally drained curd is recovered, it can be subjected to an ultrafiltration and the resulting filtrate which contains the whey proteins can be subjected to a heat treatment to obtain denatured whey proteins (DWP) which are advantageously recycled upstream of the method during the standardization (Iiii) or (Iiii') of the dairy mixture in step (I) of preparing the cheese-making dairy mixture.

According one a variant, cooling of the curd in step (IV) is carried out by lowering the temperature to a value of 0-30°C.

The interest of the method of the disclosure is reinforced if it is combined with a particular method for obtaining the cheese-making dairy mixture. While improving the draining performance, obtaining a cheese-making dairy mixture as described below leads to a standardized milk, ideally suited to the type of cheese to be manufactured.

Thus, said mixture is obtained from cow's, goat's or sheep's milk, but also from other mammals, and from any mixture of these milks. Preferably, according to the disclosure, it is goat's milk, optionally mixed with cow's milk. Thus, the method of the disclosure may further comprise the following steps:

a) pasteurization of the raw milk;

(b) skimming of the pasteurized whole milk and recovery of the skimmed milk, on the one hand, and cream, on the other hand;

c) microfiltration of the skimmed milk and recovery of the microfiltration retentate;

the microfiltration retentate recovered in step c) being a dairy fraction intended to be mixed with the cream recovered in step b) for the preparation of said cheese-making dairy mixture prepared in step (I).

According to a preferred variant of the disclosure, the skimming c) of the whole milk is maximal, or even total.

Microfiltration c) will allow the passage through the filtration membrane of a part of the soluble proteins, and the retention by this membrane of macromolecules, namely casein micelles, residual fat and any bacteria present.

In a particular implementation of the method, the microfiltration of the skimmed milk c) is carried out on a microfiltration membrane whose average pore diameter is 0.1-10 μm and preferably 0.1-3 μm. The microfiltration membrane may be a ceramic membrane or an organic membrane, preferably it is a ceramic membrane and even better a ceramic membrane with a permeability gradient (GP).

The microfiltration of the skimmed milk c) is, according to a particularexample, performed by applying a pressure difference of 1-2 bars between the inlet and the outlet of the microfiltration membrane, preferably 1.5-2 bars. Advantageously the pressure at the inlet is 2-4 bars and the pressure at the outlet is 0.5-2 bars.

After microfiltration of the skimmed milk c) according to the above variant, the microfiltration retentate constituting a dairy fraction and the cream intended for the preparation of the cheese-making dairy mixture (I) are subjected to a heat treatment (Ii), separately, or (Iii') mixed beforehand. It can be carried out at a temperature of 65-120°C, advantageously 80-95°C, for 30-900 seconds, advantageously for 50-600 seconds.

According to one variant, the above method may be supplemented by the following steps:

d) recovery of the microfiltration permeate from step c), ultrafiltration of said permeate and recovery of the ultrafiltration retentate,

e) heat treatment of all or part of said ultrafiltration retentate at a temperature of 65-100°C for 30-900 seconds, and

f) mixing of the heated ultrafiltration retentate with the mixture from step Iii) or the mixture from step Iii') in steps Iiii) and Iiii'), respectively, to obtain a cheese-making dairy mixture.